

## IN-SITU X-RAY DIFFRACTION FROM LITHIUM-ION BATTERIES

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For emerging applications, low cost and safe electrode materials with higher capacities are necessary for commercial lithium-ion batteries. One candidate material is silicon, due to its abundance and high energy density, however, present Si electrodes are not satisfactory due to poor cycling stability, manufacturing costs, and/or insufficient capacity improvement. Nanocomposites of silicon nanoparticles (20 nm) in graphene sheets and graphite exhibit excellent capacities and improved cycling stability and are formed by simple processing methods that are easily scalable and inexpensive. In-situ x-ray diffraction from these nanocomposite electrodes have been utilized to probe the structural and chemical changes in a Si-graphene composite electrode when used in rechargeable lithium-ion batteries.